$\therefore\ \sec\beta=\dfrac{e[\sqrt{(2e^2-1)}-1]}{e^2-1}$. $\therefore\ \dfrac{e\sqrt{(2)}[\sqrt{(2e^2-1)}-1]}{2(e^2-1)}$ is semi-major axis.

$$\therefore \text{ average volume is } \tfrac{1}{2}e\left(\frac{e\sqrt{(2)}[\sqrt{(2e^2-1)}-1]}{2(e^2-1)}+\tfrac{1}{2}\right)\tfrac{1}{2}\pi=\triangle.$$

$\therefore\ \triangle=\dfrac{\pi e}{8(e^2-1)}[e\sqrt{2}(\sqrt{2e^2-1}-1)+e^2-1]=5.4345$ cubic inches, when $e=5$ inches,

72. **Proposed by B. F. FINKEL, A.M., M. Sc., Professor of Mathematics and Physics, Drury College, Springfield, Mo.**

A rod is broken at random into four pieces; find the chance that no one of the pieces is greater than the sum of the other three. [From *C. Smith's Treatise on Algebra*, p. 528.]

Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

Let a=length of rod.

By conditions of problem no part can be greater than $\frac{1}{2}a$.

Let $ABCD$—G be a cube side a.

Let $Abcd$—g be a cube side $\frac{1}{2}a$.

For favorable cases the points are confined to the smaller cube.

$\therefore$ chance$=\dfrac{(\frac{1}{2}a)(\frac{1}{2}a)(\frac{1}{2}a)}{(a)(a)(a)}=\frac{1}{8}$.

73. **Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.**

On an average 1 vessel out of every n is wrecked. Find the chance that out of m vessels expected p at least will arrive safely.

I. **Solution by the PROPOSER.**

The chance of a vessel arriving is $[(n-1)/n]$.

The chance of a vessel not arriving is $1/n$.

The event will happen if, m, $(m-1)$, $(m-2)$, $(m-3)$, $(m-4)$, ... down to p vessels arrive.

Thus the required chance is the sum of the first $(m-p+1)$ terms in the expansion of

$$\left(\frac{n-1}{n}+\frac{1}{n}\right)^m=\left(\frac{n-1}{n}\right)^m+\frac{m}{1}\left(\frac{1}{n}\right)\left(\frac{n-1}{n}\right)^{m-1}+\frac{m(m-1)}{2!}\left(\frac{1}{n}\right)^2\left(\frac{n-1}{n}\right)^{m-2}$$

$$+\ \ldots\ldots\frac{m!}{p!(m-p)!}\left(\frac{1}{n}\right)^{m-p}\left(\frac{n-1}{n}\right)^p.$$

If $n=10$, $m=5$, $p=3$, we get chance$=(\frac{9}{10})^5+5(\frac{1}{10})(\frac{9}{10})^4+10(\frac{1}{10})^2(\frac{9}{10})^3$ $=\frac{12393}{12500}$.